Symposium of the Pan-American Association of Aerobiology
Penn State University, University Park, Pennsylvania

Aerobiology 2007

June 8 - 11, 2007

Spore Camp

June 12-13, 2007

Aerobiology 2007

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CONFERENCE SCHEDULE

Workshops June 8 ♦ Symposium June 8-11 ♦ Spore Camp June 12-13

Friday, June 8

7:30-8:30
Conference Registration - *Buckhout Lab Building, Room 201*

8:30-12:30
Pre-Conference Workshop - *Buckhout Lab Building, Room 201*
Nuts and Bolts of Indoor Allergen Assays

12:30-1:30
Lunch on your own

1:30- 5:30
Pre-Conference Workshop- *Life Sciences Building, Room 006*
Modeling of Indoor Air Flows and Aerosol Transport Using CONTAMW

1:00-5:30
Conference Registration - *Life Science Building, Lobby (in front of Berg Auditorium - Room 100)*

6:00-9:00
Welcoming Reception - *Nittany Lion Inn Outdoor Patio*
In case of inclement weather the reception will be held in the Faculty Staff Club Room

Saturday, June 9

7:30-8:30
Conference Registration - *Life Science Building, Lobby (in front of Berg Auditorium - Room 100)*

8:30-9:00
Opening Remarks - Annalisa Ariatti, Conference Chair; Charles Barnes, PAAA President - Life Sciences Building, Berg Auditorium - Room 100

Welcome Address - Bruce McPheron
Pennsylvania State University Associate Dean for Research and Director of the Pennsylvania Agricultural Experiment Station - Life Sciences Building, Berg Auditorium - Room 100

9:00-9:45
Plenary Talk - *Life Sciences Building, Berg Auditorium - Room 100*
Seed Dispersal in Landscape
David Mortensen
Department of Crop and Soil Science, Pennsylvania State University, University Park, PA, U.S.A.

9:45-10:00
Coffee Break - *Life Sciences Building, Lobby*

Session 1 - General Aerobiology 10:00- 11:20

Life Sciences Building, Berg Auditorium - Room 100
Moderator: Giuseppe Frenguelli

10:00-10:20
The impact of the expected climate change on Cupressaceae main pollen season in central Italy
Tommaso Torrigiani Malaspina[1], Marco Moriondo[2], Lorenzo Cecchi[1], Marco Bindi[2], and Simone Orlandini[1,2]
[1]Interdepartmental Centre of Bioclimatology, University of Florence, Florence, Italy
[2]Department of Agronomy and Land Management, University of Florence, Florence, Italy
(*Winner of one of the Lanzoni's Student Fellowships*)

10:20-10:40
The biodiversity of air spora in Brufa (Italy)
Donát Magyar[1], Giuseppe Frenguelli[2], Emma Bricchi[2], and Emma Tedeschini[2]
[1]Plant Protection Institute, Hungarian Academy of Sciences, Budapest, Hungary
[2]University of Perugia, Perugia, Italy

10:40-11:00
Geographic and temporal differences in airborne fungal concentrations in Hawaii
Michael Muilenberg[1], Christine Rogers[1], and Elizabeth Tam[2]
[1]University of Massachusetts-Amherst, MA, U.S.A.
[2]University of Hawaii, Honolulu HI, U.S.A.

11:00-11:20
Data in aerobiology: How normal is the normal distribution?
Eckhard Limpert[1], James Burke[2], Carmen Galan[3], Maria del Mar Trigo[4], Jonathan S West[5], and Werner A Stahel[6]
[1]ELI-O-Research, Scheuchzerstrasse 210, Zurich, Switzerland
[2]Defense Science Technology Laboratory, Porton Down, United Kingdom
[3]Department of Botany, Ecology and Plant Physiology, University of Cordoba, Cordoba, Spain
[4]Department of Plant Biology, University of Malaga, Malaga, Spain
[5]Rothamsted Research, Plant Pathogen Interactions Division, Harpenden, United Kingdom
[6]Statistics Group, Swiss Federal Institute of Technology Zurich, ETHZ, Zurich, Switzerland

Session 2 - Indoor Aerobiology 11:20-12:00

Life Sciences Building, Berg Auditorium - Room 100
Moderator: Mike Muilenberg

11:20-11:40
Preliminary comparative survey between viable and non-viable fungal spores in the main University library in Poznan (Poland)
Inmaculada Bustos Delgado[1,2], Alicja Stach[1], Malgorzata Nowak[1], and Agata Szymanska[1]
[1]Laboratory of Aeropalynology Adam Mickiewicz University Poznan (Poland)
[2]National Pollen and Aerobiology Research Unit University of Worcester (UK)

11:40-12:00
Fungi in buildings after the Atlantic Gulf Coast hurricanes 2005
Rajiv R. Sahay
Environmental Diagnostics Laboratory, Pure Air Control Services, Inc., Clearwater, FL 33760, U.S.A.

12:00-1:30
Buffet Lunch - *Life Sciences Building, Bridge 3rd Floor*
&
PAAA Executive Board Meeting - *Life Sciences Building, Room 012*

1:30-2:15
Plenary Talk - *Life Sciences Building, Berg Auditorium - Room 100*
Sampling the lower atmosphere for biota: The challenge, tools and successes
Elson Shields
Dept of Entomology, Cornell University, Ithaca, NY, U.S.A

Session 3 - Aerobiology and Agriculture 2:15-3:35 *- Life Sciences Building, Berg Auditorium - Room 100*
Moderator: Carmen Galan

2:15-2:35
Factors affecting *Phakopsora pachyrhizi* urediniospore adhesion to soybean leaves
Maria C. Vélez-Climent[1], D. G. Luster[2], Scott. A. Isard[1], and Erick D. DeWolf[1]
[1]Department of Plant Pathology, Pennsylvania State University, University Park, PA, U.S.A
[2]USDA-ARS, FDWSRU, Ft. Dietrich, MD. U.S.A.

2:35-2:55
The removal of *Phakopsora pachyrhizi* urediniospores from soybean leaves by prolonged rainfall
Nicholas S. Dufault[1], Scott A. Isard[1], David L. Wright[2], and Jim J. Marois[2]
[1]Department of Plant Pathology, Pennsylvania State University, University Park, PA, U.S.A.
[2]North Florida Research and Education Center, University of Florida, Quincy, FL, U.S.A.

2:55-3:15
Application of shelterbelt and Lagrangian particle models for simulations of maize pollen dispersal
Craig A. Clark[1,2], Raymond W. Arritt[2], and Eugene S. Takle[2]
[1]Valparaiso University, Valparaiso, IN, U.S.A.
[2]Iowa State University, Ames, IA, U.S.A.

3:15- 3:35
Aerial transport of soybean rust spores into the Ohio River valley during September 2006
Scott A. Isard[1], Joseph M. Russo[2], and Annalisa Ariatti[3]
[1] Department of Plant Pathology, Pennsylvania State University, University Park, PA, U.S.A.
[2]ZedX Inc. Bellefonte, PA, U.S.A.
[3] Department of Geography, University of Illinois, Urbana, IL, U.S.A.

3:35-3:50
Coffee Break - *Life Sciences Building, Lobby*

3:50
Group Photo - *In front of the Life Science Building*

4:00 -7:00
Visit to a Pennsylvania Vineyard and Wine Tasting - *Bus in front of the Life Science Building*

Sunday, June 10

8:30- 9:15
Plenary Talk - *Life Sciences Building, Berg Auditorium - Room 100*
Progress in bioaerosol detection techniques: characterizing morphologically indiscernible bioaerosols
Brett Green
Allergy and Clinical Immunology Branch, Health Effects Laboratory Division, National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention, Morgantown, WV, U.S.A.

Session 4 - Aerobiology and Health 9:15-10:15

Life Sciences Building, Berg Auditorium - Room 100
Moderator: Charles Barnes

9:15-9:35
Allergenic activity of *Ole e 1* and *Lol p 1* in the atmosphere of Cordoba
Carmen Galán, M. Gómez-Domenech, Herminia García-Mozo, and Eugenio Domínguez-Vilches
Departamento de Botánica, Ecología y Fisiología Vegetal. Universidad de Córdoba, Spain

9:35-9:55
Aerobiology for public health - A case study at Hyderabad, India
O.Bhagya Lakshmi, Palle Venkata Saroja, and K. Jjyothi
Aero-Biotechnology Lab, Department of Botany, Sarojini Naidu Vanita Maha Vidyalaya, Exhibition Grounds, M.J.Road, Hyderabad, Andhra Pradesh, India.

9:55-10:15
Pollen and fungal spores in the atmosphere of San Juan, Puerto Rico: a retrospective study from May 2005 until May 2006
Elizabeth Quintero[1], Felix E. Rivera-Mariani[2], and Benjamín Bolaños[2].
[1]Turabo University, Caguas, Puerto Rico
[2]University of Puerto Rico, Medical Science Campus, Rio Piedras, Puerto Rico
(Elizabeth Quintero & Felix E. Rivera-Mariani co-winners of one of the Lanzoni's Student Fellowships)

10:15-10:30
Coffee Break - *Life Sciences Building, Lobby*

Session 5 - General Aerobiology 10:30-11:10

Life Sciences Building, Berg Auditorium - Room 100
Moderator: Chris Rogers

10:30-10:50
Airborne fungi near a compost facility in northeast Oklahoma
Estelle Levetin and Scott Gillum
University of Tulsa, Tulsa, OK, U.S.A.

10:50- 11:10
Isolation of fungal spores in stream waters: Methods, recommendations and study of a dispersal pathway
Joël Hobeila, Paul Comtois, François Courchesne, and André G. Roy
Université de Montréal, Montréal, Canada.

PAAA General Membership Meeting 11:10 -12:30
Life Sciences Building, Berg Auditorium - Room 100

12:30-1:30
Buffet Lunch - *Life Sciences Building, Bridge 3rd Floor*

1:30- 2:15
Plenary Talk - *Life Sciences Building, Berg Auditorium - Room 100*
Data resources for aerobiological modeling
Joseph Russo
ZedX Inc., Bellefonte, PA, U.S.A.

Session 6 - Aerobiology and Ragweed pollen 2:15-3:35
Life Sciences Building, Berg Auditorium - Room 100
Moderator: Regula Gehrig

2:15-2:35
Diurnal variation of airborne ragweed pollen in Kansas City - A 10 year perspective
Charles Barnes, Frank Hu, and Jay Portnoy
Children's Mercy Hospital, Kansas City, MO, U.S.A.

2:35-2:55
Evolution of ragweed and allergies prevalence in Québec in the past 20 years
Paul Comtois and Beatriz Escamilla
Université de Montréal, Montréal, Canada

2:55-3:15
Ambrosia pollen in Cracow, Poland in 1995-2006.
Danuta Stepalska[1], Dorota Myszkowska[2], Jerzy Wolek[3], and Katarzyna Piotrowicz[4]
[1] Institute of Botany, Jagiellonian University, Cracow, Poland
[2] Department of Clinical and Environmental Allergology, Jagiellonian University, Medical College, Cracow, Poland
[3] Institute of Biology, Academy of Pedagogy, Cracow, Poland
[4] Department of Climatology, Jagiellonian University, Cracow, Poland

3:15-3:35
Influence of meteorological parameters on ragweed pollen concentration in Baranja region (Croatia)
Edita Stefanic[1] and Sanda Rasic[1]
[1]J.J. Strossmayer University, Faculty of Agriculture, Trg Svetog Trojstva 3, 31000 Osijek, Croatia

3:35-3:50
Coffee Break - *Life Sciences Building, Bridge 3rd Floor*

Ragweed Discussion Group 3:50-6:00
Life Sciences Building, Berg Auditorium - Room 100
Discussion Leaders: Regula Gehrig (MeteoSwiss) and Scott Isard (Pennsylvania State University)

7:00-10:00 pm
Conference Banquet - *Nittany Lion Inn (Ballroom AB)*

Monday, June 11

8:30-9:15
Plenary Talk - *Life Sciences Building, Berg Auditorium - Room 100*
Phytophthora database: A cyberinfrastructure supporting the identification, monitoring, and management of a major plant pathogen group
Seogchan Kang
Dept. Plant Pathology, Pennsylvania State University, University Park, PA, U.S.A.

Session 7 - Aerobiology Techniques 10:45 –12:45

Life Sciences Building, Berg Auditorium - Room 100
Moderator: Paul Comtois

9:15-9:35
Comparison of fungal spore counting techniques
Ginette Leclaire[1] and Lawrence D. Syzdek[2]
[1]Mukês Laboratoire Inc., Montreal, Quebec, Canada
[2]Aerobiological Research Station, Albany, New York, U.S.A.

9:35-9:55
Comparison of pollen sampling by a new and old model of Hirst type of sampler
Ivan Stefanic[1] and Edita Stefanic[2]
[1] J.J. Strossmayer University, Technology Development Centre Osijek Ltd., Gajev trg 6, 31000 Osijek, Croatia
[2]J.J. Strossmayer University, Faculty of Agriculture, Trg Svetog Trojstva 3, 31000 Osijek, Croatia

9:55-10:10
Coffee Break - *Life Sciences Building, Lobby*

Session 8 - Aerobiology Posters 10:10-11:10

Life Sciences Building, Bridge 3rd Floor
Moderator: Ines Hurtado

Linking real-time analyses with real-time policies: A meta-analytic examination of published literature investigating the presence of fungal aerospores and the occurrence of poor respiratory health in occupants of damp buildings. *Prospectus*
Bonny L. Dodson
George Mason University, Fairfax, VA, U.S.A.

Monalisa: Monitoring network of allergens by immuno-sampling
Carmen Galán[1], Herminia García-Mozo[1], Aljcia Stach[2], Michel Thibaudon[3], E. Carvalho[4], Jean Emberlin[5], Rui Brandao[6], and Auli Rantio-Lehtimaki[7]
[1]Departamento de Botánica, Ecología y Fisiología Vegetal. Universidad de Córdoba, Córdoba, Spain
[2]Adam Micvkiewicz University (AMU), Poznan, Poland
[3]Réseau National de Surveillance Aérobiologique (RNSA) St Genis l'Argentiére. France
[4]Bertin Technologies, St Quentin en Yvelines, France.
[5] National Pollen Research Unit, University of Worcester, UK.
[6]University of Evora, Portugal.
[7]University of Turku, Finland.

Pollen flora of exhibition grounds with special reference to their allergic significance
K. Jyothi and O. Bhagya Lakshmi
Research Center, Department of Botany, Sarojini Naidu Vanita Maha Vidyalaya
Exhibition Grounds, Hyderabad, Andhra Pradesh, India

Prevalence of mycoflora in Hyderabad - A metro city
Palle Venkata Saroja & O.Bhagya Lakshmi
P.G.College & Research Center, Sarojini Naidu Vanita Mahavidyalaya, Exhibition Grounds, Hyderabad, Andhra Pradesh, India

Patterns of airborne *Alternaria* spores in Budapest, Hungary
Donát Magyar[1], Anna Páldy[2], Dóra Apatini[2], and Péter Csontos[3]
[1]Plant Protection Institute of the Hungarian Academy of Sciences, Budapest, Hungary, [2]National Institute of Environmental Health, Budapest, Hungary, [3]MTA-ELTE Research Group in Theoretical Biology and Ecology, Budapest, Hungary

Impact of aphid feeding on the airborne concentration, viability and germination of ragweed pollen
Donát Magyar[1], Zsuzsa Basky[2], and Balázs Kiss[2]
[1]Plant Protection Institute of Hungarian Academy of Sciences, Department of Zoology 1,
[2]Department of Pytopathology, Budapest, Hungary

Characterization of volatile organic compounds of indoor fungal isolates under different environmental conditions
Florence Okafor and Jeanette Jones
Biology Department, Alabama A&M University, Normal AL, U.S.A.

Correlation of meteorological factors, aeroallergen and asthma levels in Kuwait: a 12 month retrospective study.
Jafar A. Qasem[1], H. Nasrullah[2], A. Al-Sherafy[1], Ch. Sudheer Solman[1], S.A. Abdullah[1], M. Khan[3], H. Al-Saraff[4], L. Ashkanani[5]
[1] College of Health Sciences, Department of applied Medical Sciences
[2]Department of Environmental Health
[3]Al-Rashid Allergy Center
[4] Kuwait International air port meteorological office
[5]Air Biology Laboratory

Pollen and fungal spores in the atmosphere of San Juan, Puerto Rico: A retrospective study from May 2005 until May 2006
Elizabeth Quintero[1], Felix E. Rivera-Mariani[2], and Benjamín Bolaños[2]
[1]Turabo University, Caguas, Puerto Rico
[2]University of Puerto Rico, Medical Science Campus, Rio Piedras, Puerto Rico
(Elizabeth Quintero & Felix E. Rivera-Mariani co-winners of one of the Lanzoni's Student Fellowships)

Aero mycological studies in the library of Jalgaon, India
Gauri Rane[1], Kishor Mahajan[1], and Sanjay Pawde[2]
[1] KCE Society's Moolji Jaitha College, Jalgaon, Maharashtra,India 425 002
[2] KCE Society's College of Engineering and Information Technology, Jalgaon, India

Airborne pollen & mold during the winter months in central Minnesota
Stephen G. Saupe, Andrew Soutar, and John Turtle
College of St. Benedict/St. John's University, Collegeville, MN, U.S.A.

Phakopsora pachyrhizi urediniospore escape from a soybean canopy
Jeremy Zidek
Department of Plant Pathology, Pennsylvania State University, University Park, PA, U.S.A.

PAAA Working Groups 11:10-12:00
Life Sciences Building, Room 011

12:00-1:30
Lunch Life Sciences Building, Bridge 3rd Floor

Session 9 - Unknown Workshop 1:30-3:30
Life Sciences Building, Berg Auditorium - Room 100
Chair: Estelle Levetin

Tuesday, June 12

Spore Camp

8:00
Coffee and Snacks - *Buckhout Lab Building, Room 208B*
Field trip

12:00
Lunch (provided)

Afternoon
Lecture and Lab activities - *Buckhout Lab Building, Room 103*

Wednesday, June 13

Spore Camp

8:00
Coffee and Snacks - *Buckhout Lab Building Room 208B*
Field trip

12:00
Lunch (provided)

Afternoon
Lecture and Lab activities - *Buckhout Lab Building, Room 103*

Aerobiology 2007

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ABSTRACTS

Oral Presentations

THE IMPACT OF THE EXPECTED CLIMATE CHANGE ON CUPRESSACEAE MAIN POLLEN SEASON IN CENTRAL ITALY

Tommaso Torrigiani Malaspina[1], Marco Moriondo[2], Lorenzo Cecchi[1], Marco Bindi[2], and Simone Orlandini[1,2]
[1]Interdepartmental Centre of Bioclimatology, University of Florence, Florence, Italy
[2]Department of Agronomy and Land Management, University of Florence, Florence, Italy

Cupressaceae family has been recognized as a unique source of an increasing number of winter pollinosis in Mediterranean countries. In the area of Florence, Central Italy, cypress (*Cupressuss sempervirens*) represents the only source of *Cupressaceae* pollen during winter months. Due to its abundant presence, the concentration of airborne pollen in the area and the impact on allergenic population are dramatically high. It has been well demonstrated that the period of pollination of cypress (Main Pollen Season, MPS) shows a high variability year by year, depending on meteorological factors and increasing temperatures as observed in the last 20 years caused an advanced MPS in many countries. Accordingly, the aim of the present study is to investigate the effects of the expected global warming on the start date and end date of *Cupressaceae* MPS in the area of Florence. With this aim, a stochastic weather generator (LARS WG) was run to derive daily Tmin, Tmax and rainfall for the present (1990-2006) and future period (2007-2099) (SRES scenario A2). Changes in monthly mean Tmin, Tmax and rainfall were obtained by HadCM3 General Circulation Model and included in LARS WG for the analysis. Tmin and Tmax as simulated by LARS WG were then used as inputs to run the phenological model of male cypress flower proposed by Torrigiani Malaspina et al. (2007) for the area of Florence, in order to calculate the MPS of cypress in the next hundred years. The results indicated a progressive anticipation in MPS in 2007-2099 period (from mid February nowadays to mid December at the end of the century). Taking into consideration similar effects of global warming on other allergenic species, present results suggest that the advance of cypress flowering phase could contribute to make allergic season almost all year long in the area under study.

THE BIODIVERSITY OF AIR SPORA IN BRUFA (ITALY)

Donát Magyar[1], Giuseppe Frenguelli[2], Emma Bricchi[2], and Emma Tedeschini[2]
[1]Plant Protection Institute, Hungarian Academy of Sciences, Budapest, Hungary
[2]University of Perugia, Perugia, Italy

The atmosphere is rich in different fungal spores. The species composition of air spora changes according to weather. Biodiversity indices are widely used for faunistic and floristic characterization of habitats. The aims of this study were (1) to apply biodiversity indices for characterizing air spora and (2) to reveal the relationship between air spora biodiversity and meteorological parameters. Spore and meteorological data were collected for three years from May to July. A 7-day recording Hirst-type air sampler was used to record daily concentration of 144 different airborne fungal taxa at 12 m height in a vineyard, in Brufa (Italy). Biodiversity was expressed by the Shannon's index. To clarify the connection between biodiversity and weather variables, Pearson's Correlation Analysis was applied. Right Tail Sum (*RTS*) biodiversity ordering method was used to show the diversity dissimilarity among dry and wet days. More than the half (52%) of the fungal taxa were classified as genus or family, and 62 of them was identified on species level. Mitosporic fungi (57.0%) and Ascomycetes (25.7%) represented a great proportion of the total air spora. The diversity of air spora was significantly affected by meteorological factors. Positive correlation was found between Shannon's index and temperature, while precipitation had negative effect on spore diversity. Wind speed reduced the diversity of the air spora significantly, possibly because spore-laden air was diluted. There were no significant correlations between wind directions and spore diversity. According to the RTS diversity ordering, species rank for dry days were as follows: hyphal fragments, *Cladosporium*, *Basidiomycetes*, *Alternaria* spp., *Tranzscheliella hypodytes*. Species rank for wet days: unknown hyaline 3-septate fusiform spores, unknown hyalodidymae, *Cladosporium*, hyphal fragments, *Pleospora*. The comparison of the RTS curves showed that the high concentration of *Cladosporium* on dry days reduces the diversity of the dominant species. However, with the exception of the three most dominant species, the air samples on dry days were more diverse than on wet ones. In wet days there were no species prevailing the samples as *Cladosporium* in dry days, thus wet days showed higher biodiversity concerning its first and second dominant taxa, than dry days.

GEOGRAPHIC AND TEMPORAL DIFFERENCES IN AIRBORNE FUNGAL CONCENTRATIONS IN HAWAII

Michael Muilenberg[1], Christine Rogers[1], and Elizabeth Tam[2]
[1]University of Massachusetts-Amherst, MA, U.S.A.
[2]University of Hawaii, Honolulu HI, U.S.A.

As part of a study of volcanic fog (VOG) exposure and respiratory health of school-aged children on the Big Island of Hawaii, airborne fungi were briefly surveyed to obtain pilot data and evaluate associations with asthma.
A Burkard Recording Spore Sampler was operated for 2 weeks in each of 7 locations around the island. Spore concentrations were determined at 2-hour intervals and compared with weather parameters; data from Weather Underground (wunderground.com) and NOAA (National Climatic Data Center). Spore data from 5 locations, 10 days total, have been analyzed to date.
Spore concentrations from Hilo and Kona (average daily min./max: 1,710/177,000 and 10,400/216,000 spores/m^3, respectively) showed a higher level of diurnal cycling compared to Waimea and Ka'u (average min./max: 3,400/10,400 and 3,700/30,700 spores/m^3, respectively). In Hilo and Kona, spore concentrations are lowest during mid day when trade winds or sea breezes are off the water and highest at night when winds come from the island interior. Colorless basidiospores and ascospores predominated; mitospores were a minor component of the total.
Average monthly temperatures in Hawaii show only slight seasonal (3°C range) and diurnal (range ~7°C) differences. Relative humidity and rainfall vary geographically (annual rainfall; Hilo=330 cm/yr; Waimea=75 cm/yr) and show slight seasonal and striking diurnal differences. Rainfall during the month of sampling at each location was: Hilo (28 cm); N. Kona (2.5 cm); S. Kona (15 cm); Waimea (3.5 cm); and Ka'u (1.0 cm). Wind patterns are cyclic but can still be quite complex, especially on the island of Hawaii, being influenced by trade winds, land and sea breezes, and mountainous terrain. Wind direction, temperature and relative humidity co-vary, leading to difficulties teasing out the most influential weather parameter; wind direction is likely a major player. These factors, in addition to intrinsic fungal mechanisms, all work together in complex ways to influence spore release and dispersal.

DATA IN AEROBIOLOGY: HOW NORMAL IS THE NORMAL DISTRIBUTION?

Eckhard Limpert[1], James Burke[2], Carmen Galan[3], Maria del Mar Trigo[4], Jonathan S West[5], and Werner A Stahel[6]
[1]ELI-O-Research, Scheuchzerstrasse 210, Zurich, Switzerland
[2]Defense Science Technology Laboratory, Porton Down, United Kingdom
[3]Department of Botany, Ecology and Plant Physiology, University of Cordoba, Cordoba, Spain
[4]Department of Plant Biology, University of Malaga, Malaga, Spain
[5]Rothamsted Research, Plant Pathogen Interactions Division, Harpenden, United Kingdom
[6]Statistics Group, Swiss Federal Institute of Technology Zurich, ETHZ, Zurich, Switzerland

Several frequency distributions have been used to characterize and summarize data in aerobiology, among which the normal distribution - despite certain doubts raised among aerobiologists - continues to be most popular. Although, in fact, this model is the standard of quantitative variation across the sciences, there is continuous concern about its present use and about data analysis. As a result, an *ad hoc* "Working Group Data Analysis" formed at the 8th International Congress on Aerobiology, where the Group was asked to consider these points further.
Evidently, there are problems with the quantitative variation of original data on the one hand, and the normal distribution on the other. Too often, the mere summary data - published even in peer reviewed journals - immediately demonstrate that the normal distribution would not be a good fit. This is the case with data summarized by 500 ± 500, which would mean, by definition of the normal distribution that 16% of the data would have to be below zero - which is impossible for most data sets.
More fundamentally, a closer look at the normal distribution shows, that the model is based on addition, in contrast to natural laws that, above all, multiply and divide. In accordance with multiplication, however, is the multiplicative (or log-) normal distribution. After recent developments, the multiplicative normal distribution can now be handled very similarly and as easily as the normal distribution. In general, after comprehensive analyses we find that the multiplicative normal fits the data better than the (additive) normal distribution.
The problems and chances will be demonstrated with recent data from aerobiology. There are several further models of skewed distributions for the variety of needs, *e.g.,* the power law, the Gamma, the exponential and the Weibull distributions, and careful consideration is recommended to find the most appropriate one for a particular purpose and dataset. In the end, it is one of our major aims to stimulate a fundamental discussion on the normal distribution and the origin of variability which is overdue, worth the effort, and needed.

PRELIMINARY COMPARATIVE SURVEY BETWEEN VIABLE AND NON-VIABLE FUNGAL SPORES IN THE MAIN UNIVERSITY LIBRARY IN POZNAN (POLAND)

Inmaculada Bustos Delgado[1,2], Alicja Stach[1], Malgorzata Nowak[1], and Agata Szymanska[1]
[1]Laboratory of Aeropalynology Adam Mickiewicz University Poznan, Poland
[2]National Pollen and Aerobiology Research Unit University of Worcester, UK

The study was carried out in the main library of the Adam Mickiewicz University in Poznan. Two different methods were used in this study. The Andersen single stage bioaerosol sampler with agar plates (viable method) and a Hirst type portable sampler (non-viable method) carrying a microscope slide. Both samplers were working at the same time. Sampling took place in five rooms of the library, including an environment-controlled secure room containing old books (XIV to XIX century).
A total of 304.110 spores and 2.750 CFU (Colonies Forming Unit) were detected during the study period. Fifty five taxonomic types were identified: *Agaricus, Agrocybe, Albugo, Alternaria, Arthrinium, Ascobolus,* Ascospores, Aspergillaceas, *Bipolaris, Bispora, Botrytis, Bovista, Chaetomium, Chaetosphaerella, Chlorophylum, Cladosporium*, Colour Basidiospores, *Coprinus*, Diatrypaceae, *Drechslera, Dydimella, Epicoccum, Fusicladium, Ganoderma, Geotrichum, Gliomastix,* Hyaline Ascospores, Hyaline Basidiospores, *Leptosphaeria, Monodyctis, Nigrospora, Oidium, Paraphaeosphaeria, Periconia, Peronospora, Phoma, Pithomyces, Pleospora, Puccinia, Septonema, Sordaria, Spondylocladiella, Sporobolomyces, Stachybotrys, Stemphylium, Tilletia, Tilletiopsis, Tomentella, Torula, Ulocladium, Ustilago, Venturia* and Xylariaceae.
Among these types, only seven were detected in both samplers: *Alternaria*, Aspergillaceas (*Aspergillus*/*Penicillium*), *Chaetomium*, *Cladosporium*, *Periconia* and *Ulocladium*.
The genus *Aspergillus* and *Penicillium* were the most abundant types found using both the Andersen sampler, with 1.610 CFU, and the Hirst type sampler, with 175.010 spores. Spores from the genus *Cladosporium* were the second in abundance for both viable and non-viable methods with a 360 CFU and 51.170 spores, respectively.

FUNGI IN BUILDINGS AFTER THE ATLANTIC GULF COAST HURRICANES 2005

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After the Gulf Coast Hurricane session of 2005 (Dennis, Emily, Katrina, Rita, Wilma etc.), a post hurricane evaluation of fungal diversity in hurricane damaged buildings were conducted as a part of an Indoor Environmental Quality (IEQ) assessment. Altogether, five hundred thirty (530) air-samples (Spore Trap Technique: Air-O-Cell) from five hundred twenty six (526) test sites and one thousand thirty four (1,034) surface samples (Bio-scan^{400}) from one thousand twenty six (1,026) test sites representing one hundred four (104) buildings spread over four (4) different states: Alabama, Louisiana, Mississippi and Texas in North America were analyzed. Qualitatively, Dematiaceous fungal spore elements were reported as the most frequently observed fungal derivate followed by *Aspergillus Penicillium*-like spores in air samples where as surface samples revealed that, *Aspergillus/Penicillium* like spores were the most common fungal component. Quantitatively, a mean value of thirteen thousand nine hundred and sixty eight (13,968) cts/m^3 was observed in case of indoor air-borne fungi where as the average counts for outdoor air-borne fungi were two thousand and sixty eight (2,068) cts/m^3. In contrast, surface samples showed a mean value of sixty seven thousand three hundred twenty six (67,326) cts/cm^2 for fungi collected from indoor sites. The result of this study could be used as a potential source of comparative data for the interpretation of fungal diversity in buildings after natural disasters as a part of IEQ investigations for detection of mold in hurricane damage buildings.

SAMPLING THE LOWER ATMOSPHERE FOR BIOTA: THE CHALLENGE, TOOLS AND SUCCESSES

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The ability to collect biota in the lower atmosphere in scientifically significant quantities allows researcher to identity the life stage of the organism moving long distance, and investigate the physiological state of the organism during the long ranged movement. The ability to collect aerial samples of biota transitions aerobiologists from theoretical discussions to experimental investigations.

The challenge of collecting aerial biota increases dramatically as the distance from the source increases. Aerial densities of microscopic biota frequently fall in the one to several particles per cubic meter of air. In contrast, the aerial densities of insects are usually in the range of a few individuals per 1000 cubic meters of air.

If the focus of the research is to use the aerial density of the biota over a relative time period to understand the various environmental factors influencing departure, horizontal movement and deposition, relative large quantities of air need to be sampled over a relatively short period of time to collect significant numbers of the target biota. If aerial densities of biota are 1 particle per cubic meter then the airborne sampler needs to have a sampling capacity of 3-10 cubic meters per min (3-10,000 L). If the aerial densities are a few individuals per 1000 cubic meters, then the sampling capacity needs to be in the range of 500-1000 cubic meters per min.

Our traditional ground based samplers have a sampling capacity of 5-40 L per min. Samplers mounted on balloons, blimps, kits and towers have collection rates which are wind speed dependent. Full scale aircraft have high sampling rates but are limited to a minimum altitude of 160 meters, and are expensive to operate. Large RC airplanes have been developed which can sample large quantities of air, operate within 30 meters of the ground, operate in approaching storm fronts and fly during dusk and full darkness. Research results from the projects using large RC airplanes will be discussed.

FACTORS AFFECTING *PHAKOPSORA PACHYRHIZI* UREDINIOSPORE ADHESION TO SOYBEAN LEAVES

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The abaxial surface of soybean leaves (cv. Williams) from the second and third nodes of plants at the V2-V3 growth stages were inoculated with *Phakopsora pachyrhizi* urediniospores (200 spores/mL). Isolates from Alabama (AL) and Louisiana (LA) where used to inoculate the samples which were placed in a moisture chamber and incubated at optimal conditions of ~100% RH and 20ºC for specific time periods ranging from 0h to 48h. The leaves were washed to remove unattached spores and the remaining spores were dyed with lactophenol cotton blue and counted under a light microscope. Preliminary results show that urediniospores start adhering to soybean leaves within the first hour of inoculation and nearly all adhered spores have started to germinate. The AL and LA isolates had very similar adhesion timelines but differed greatly in germination stage progression rates. Live and dead LA isolate urediniospores were tested for adhesion to glass slides and Petri plates. Live spores germinated and adhered to all surfaces and dead spores adhered to none. This suggests that spore adhesion is dependent on metabolic activity and germination.

The experiment was also performed using trifoliolates from the first and second nodes of plants at the V5 growth stage and inoculated on the adaxial surface of the leaf with LA isolate urediniospores. Compared to the previous experiment, more than double the amount of inoculated spores appears to adhere to the adaxial surface of older leaves than to the abaxial surface of younger leaves within the first hour of inoculation. Further experiments will be conducted to compare the effects of leaf age and inoculation surface on *P. pachyrhizi* urediniospore adhesion.

THE REMOVAL OF *PHAKOPSORA PACHYRHIZI* UREDINIOSPORES FROM SOYBEAN LEAVES BY PROLONGED RAINFALL

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The urediniospores of *Phakopsora pachyrhizi* travel vast distances through the atmosphere, and can be deposited onto soybean leaves via rainfall. The spores require metabolic activity for adhesion to occur on the soybean leaf. However, when a spore is deposited onto a soybean leaf it is generally not metabolically active, and thus can be washed from the leaf surface by continual rainfall. A portable rainfall simulator was developed to examine the wet deposition and removal of urediniospores from soybean leaves. Soybean plants were placed into the rainfall simulators sample area, and exposed to periods of rainfall with spores followed by rainfall without spores. Initial results indicate that a 3 minute period of rainfall without spores, following a 30 second rainfall period with spores, can significantly reduce the number of spores retained on the upper leaves of soybean plants. Further research is being conducted to examine the effects of different rainfall durations without spores, at multiple rain intensities, on the spore removal process.

APPLICATION OF SHELTERBELT AND LAGRANGIAN PARTICLE MODELS FOR SIMULATIONS OF MAIZE POLLEN DISPERSAL

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Flow fields and pollen dispersal associated with a small maize field were explored using the Wang Takle (WT) shelterbelt model coupled with a Lagrangian particle dispersion (LPD) model. The WT model is a hydrodynamic model for shelter flow that we have converted to a fully three-dimensional configuration. To our knowledge, this is the first three-dimensional model for shelter flows. The roughness transition between an agricultural field and its surroundings produces complex flows that are difficult to represent by empirical methods. By applying the WT to this problem, we obtain a physically consistent and realistic flow field that subsequently is used to drive the stochastic LPD simulations. The LPD approach simulates the path of individual pollen grains, with particle motion determined by the WT-simulated mean flow and a stochastic turbulent velocity.

The ability of the combined models to simulate measured patterns of pollen deposition was assessed by comparing simulations with measurements for a small maize canopy isolated within a large soybean field near Ames, Iowa, USA in August 2003. The models produced realistic spatial patterns of deposition that included the sharp near-source deposition gradient, as consistent with observations, but tended to over-predict deposition away from the source field. Sensitivity tests reveal that the updraft produced by the change in roughness at the field edge promotes long-range dispersal,. The enhanced turbulent kinetic energy above the maize field also promotes long-range dispersal. These factors offset some of the direct impact of horizontal wind speed reduction over the rougher surface.

AERIAL TRANSPORT OF SOYBEAN RUST SPORES INTO THE OHIO RIVER VALLEY DURING SEPTEMBER 2006

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On 6 November 2004, soybean rust was discovered for the first time on the North American continent. The disease, caused by the pathogen *Phakopsora pachyrhizi,* was identified during the early 20th century in Japan and over the next 100 years spread to southeastern Asia, Australia, India, Africa, South America, and finally North America.
P. pachyrhizi is an obligate parasite that requires green tissue to survive and reproduce. Soybean and kudzu are its two primary hosts in the U.S. Consequently in winter, soybean rust is restricted to coastal zones of states bordering the Gulf of Mexico and in the Caribbean basin where either kudzu retains its foliage or soybeans are grown year-round. To cause significant yield losses in North America, *P. pachyrhizi* uridineospores must be blown from these areas into the major soybean production region in the continental interior between early May and August, at a time when the crop is susceptible to the disease.
Fortunately, weather conditions during late winter and spring in the overwintering area along the U.S. Gulf Coast were not favorable for soybean rust during 2004-2005 and 2005-2006. As a result, inoculum production was low in southeastern U.S. during the early 2005 and 2006 spring and summer seasons, and the pathogen did not spread into the major continental interior soybean production region.
However, late in the 2006 growing season, soybean rust appeared for the first time in the central U.S. Integrated Aerobiology Modeling System (IAMS) simulations showed that large scale southerly air flows associated with a middle latitude cyclone that traversed the North American continent from west to east between 22-26 September, advected spores from an active inoculum source region in Louisiana more than 1000 km northward. Abundant precipitation in the lower Ohio River Valley washed the spores out of the air causing infections that appeared in 36 counties beginning about two weeks later. This presentation describes an evaluation of IAMS predictions of aerial transport of soybean rust spores into the Ohio River Valley during September 2006.

PROGRESS IN BIOAEROSOL DETECTION TECHNIQUES: CHARACTERIZING MORPHOLOGICALLY INDISCERNIBLE BIOAEROSOLS

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The need to measure bioaerosols has increased dramatically in recent years due to the growing incidence of respiratory and infectious diseases. Many strategies have been developed to sample and identify personal exposures to bioaerosols; however, no strategy serves all purposes. Although current exposure assessment methodologies provide important health surveillance data, they are often time consuming and subjective. Techniques based on immunoassays and qPCR have recently been introduced to overcome some of these limitations; however the identification and quantification of submicron particles remains a challenge.
New immunodiagnostic techniques such as the Halogen Immunoassay (HIA) are an important advance that enables the detection of particle-bound antigens using human serum IgE or specific antibodies. Indoor air studies using the HIA found that non-identifiable bioaerosols such as fungal fragments could be identified as aeroallergen sources and were often higher in concentration than spores of individual allergenic fungal genera. Recently, this technique was modified to enable the characterization of even smaller bioaerosols by simultaneous double immunostaining with monoclonal antibodies and human serum IgE using fluorescent probes and confocal microscopy.
A new two-stage, cyclone-based personal bioaerosol sampler was recently developed at NIOSH. The two-stage bioaerosol sampler is a lightweight device designed primarily as a personal air-sampling device. The sampler contains two microcentrifuge tubes and a back-up filter to allow aerodynamic size fractionation of airborne particulates. Its design facilitates the deposition of bioaerosols in a format that enables direct processing for applications such as qPCR, ELISA or HIA. The two-stage bioaerosol sampler was used for the detection and size separation of co-aerosolized fungi and influenza viruses using qPCR methodologies. This technique potentially eliminates several limitations associated with other air sampling devices.
The approach of engineering new sampling devices combined with newer molecular methodologies may help elucidate the contribution that submicron bioaerosol particles make to respiratory disease.

ALLERGENIC ACTIVITY OF *OLE E 1* AND *LOL P 1* IN THE ATMOSPHERE OF CORDOBA

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The quality of life of the citizens is strongly influenced by environmental conditions. Pollen allergies are affecting to a big percentage of population in the developed countries. The existence of activity allergenic in the atmosphere not only associated to pollen grains and fungal spores, but also to biological particles of submicrónic (<1µm) and even paucimicrónic (<0.5 µm) (Spieksma et al., 1995). The origin of these allergens can be due to the rupture of pollen grains transported in the atmosphere or to the presence of allergens from other parts of the plant forming amorphous material with allergenic load. The size of these particles with a high allergenic capacity is inferior to 1µm and they can be inhaled through until the interior of the bronchi and until the alveoli, causing asthmatic reactions.
The study was carried out between March and June of 2006 in the city of Cordoba. For the determination of the antigenic activity an Andersen sampler was used. It has six stages to differentiate particles from different diameter. The particles are deposited in fibre glass filters that were inmuno-analised by indirect ELISA. Pollen data were taken using a volumetric Hirst sampler.
A similar behaviour between pollen and the total allergenic load is observed during the period of the *Olea* and Poaceae pollen season. Nevertheless, during the previous and later period to the pollen season a high allergenic load of the air was observed. Regarding to the particle size, the smallest percentage of allergenic load was observed in a first stage of sampling that allows to detect particles of greater size (>1.2 µm), as the grains of pollen. Nevertheless, a greater concentration of allergens was observed in inferior stages that allow detecting submicrónic and paucimicrónic particles. These are small size particles that can easily penetrate as deep as the alveoli.

AEROBIOLOGY FOR PUBLIC HEALTH - A CASE STUDY AT HYDERABAD, INDIA

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With a population of 81 lakhs (8,100,000) in the urban area of 1,692 sq.km., Hyderabad shows fast growth in industrialization and urbanization. People of Hyderabad breathe approximately 1,246 tons/day of air. The study aims at monitoring aeroallergens and to see their impact on human health. Monitoring of Fungal spores in six areas of different active areas was carried out using Hi-Air sampler. Continuous air sampling was done using Tilak's air sampler for fungal spores and pollen grains in one station. Spirometry, the pulmonary function test was carried out as per ATS – 1991 guidelines under the guidance of Chest Physicians with portable spirometer to the cross section of public working or residing in the specified areas.
110 fungal spore types were found accounting for 8, 48, 731 spores/m^3 of air on an average. Colony forming unit – study using Hi-Air sampler reveals maximum count in slum, relatively less in industrial and commercial zones and minimum in residential area. The total number of pollen grains trapped in two year was 7,028 and the number of pollen types identified was 53. Spirometry results confirm association between respiratory morbidity and atmospheric pollution. The data has been proved helpful in treating the allergic patients and creating awareness about their allergic disorders. Minimum pollen incidence is considered clinically significant and a safe period for the individuals who are sensitive to allergic pollen. Maximum and minimum frequency of particular pollen coincides with the flowering period of mother plants. Air monitoring and impact study on public health at such active environments will ensure sustainable development and healthy environment. Well designed epidemiological studies are essential for public health.

POLLEN AND FUNGAL SPORES IN THE ATMOSPHERE OF SAN JUAN, PUERTO RICO: A RETROSPECTIVE STUDY FROM MAY 2005 UNTIL MAY 2006

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The atmosphere contains bacteria, viruses, fungi, and volatile substances that in sufficient amounts are harmful for the health of each person exposed. The affections results from the inhalation of these particles that are dispersed by the air currents. In Puerto Rico, the respiratory diseases affect 33% of the population and, although the causes are discussed from the perspective of genetic origin, it seems to indicate that there are environmental factors that transform a high percentage of the population into susceptible ones. The Allergenco ® Air Sampler (MK3) was used to monitor the concentrations through a twelve month span. Microscope slides capture several impacts, which it is then stained with calcofluor and observed under the microscope under white and ultraviolet light. Atmospheric conditions were recorded daily through a Weather station®. The results indicate that the fungal spores are present in San Juan throughout the year. The most frequent spores were basidiospores, while the biological particulate presented a circadian rhythm where the concentration is higher during the early morning. Rain and wind were dispersal factors, and the percent of humidity and the dew point favored the increase of spores in the atmosphere. Contrary to spores, pollen is least frequent although its allergenic potential cannot be excluded. Quantification of spores and pollen serves to establish dynamism of the particular in the atmosphere, and the data obtained could be used to elaborate calendars of spores that could help the sensitized population to design preventive measures according to the atmospheric circumstances in the tropic.

AIRBORNE FUNGI NEAR A COMPOST FACILITY IN NORTHEAST OKLAHOMA

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Aspergillus fumigatus is a dominant fungus in compost and has well known health effects. Based on community concerns, this study was undertaken to examine the airborne fungi surrounding a large compost facility in northeast Oklahoma.
Total spores were sampled continuously for one year using two Burkard seven day spore traps, each equipped with an alternate orifice which provided a D_{50} of 2.17 □m. The sampler at the test site was located 0.7 Km downwind of the facility, and the second Burkard, at the control site, was 6.1 Km upwind. Burkard slides were prepared and analyzed using standard protocols, and daily spore concentrations determined. Culturable fungi were monitored weekly using Andersen single stage samplers at five locations, three downwind sites (A,B,C) and two upwind sites (D,E). Three one-minute samples were collected onto malt extract agar plates and incubated at room temperature, 37 C, or 45 C. All *Aspergillus* colonies were identified to species and other taxa to genus.
Mean concentration of total spores at the control site was significantly higher for the entire study period ($t=-7.64$, $p<0.001$). However, there was no significant difference between mean *Penicillium/Aspergillus* concentrations ($t=0.576$ $p>0.05$) at the two sites. For culturable fungi, the mean concentration of total culturable fungi from the three downwind sites was significantly higher than the control sites ($t = 5.64$, $p<0.0001$)
Mean *Aspergillus* concentrations were higher at sites A and B, the two closest sites. *Aspergillus fumigatus* was the most common *Aspergillus* species identified during the study with highest concentrations occurring at Site A which was closest to the compost.
Continuous Burkard monitoring at 0.7 Km downwind of a compost facility did not show elevated levels of total spores or *Penicillium/Aspergillus* spores; however, culturable samples collected closer to the facility showed elevated levels of total *Aspergillus* species and *A. fumigatus*.

ISOLATION OF FUNGAL SPORES IN STREAM WATERS: METHODS, RECOMMENDATIONS AND STUDY OF A DISPERSAL PATHWAY

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Aerobiology has usually been focused in describing the atmospheric pathways of fungal spores. In this way, several atmospheric trajectories were identified and studied. However, since dispersion is a passive process, spore trajectory is largely unforeseeable. Consequently, dispersal pathways of spores can change according to prevailing environmental conditions. Thus the traditional aerobiological medium, the atmosphere, can be left out by several spores populations to the profit of another medium of translation: water.
Besides specific researches on aquatic fungi, none of the published literature discusses the presence of spores in lotic environments and the possible implications of these spores in various environmental processes. The understanding of these implications associated to the presence of spores in aquatic environments inevitably begins by their census. For example, we do not know if a river can be a vector of phytopathologic or biodeterioration agents. Our research thus fits in an exploratory scientific venture, aiming at the study of the "total" content of spores in river waters, and its comparison with the airborne spora.
Studies on aquatic hyphomycetes use a variety of methods to isolate spores from water samples. Since these propagules are generally bigger than other airborne spores, evaluation of the efficiency of two isolation methods, filtration and evaporation, was undertaken.
Results reveal that both methods are suitable for fungal spore analysis in stream waters, but according to different research objectives. Filtration is well suited for both identification and quantification of spores. If evaporation allows one to identify most of the dominant spores in a given aquatic environment, it does not give a good estimate of the quantitative concentrations of spores. Moreover, filtration yields more diverse taxonomic records than evaporation. Nevertheless, dominant taxa were similar for both techniques. In conclusion, microscopic analysis is faster for evaporation than filtration, and could be used for quick estimates, but does not allow the establishment of a data base as precise as filtration.

DATA RESOURCES FOR AEROBIOLOGICAL MODELING

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All modeling begins with good data sets both in development and operations. Aerobiological models are particularly challenging because they require four-dimensional data sources to account for the three axes of space and one of time. In addition, aerobiological models require data input on several scales from international, national, regional, and local. This talk explores the steps that were taken to acquire and integrate the data resources necessary to build and operate the Integrated Atmospheric Modeling System (IAMS), which produces the soybean rust simulations for the Integrated Pest Management - Pest Information Platform for Extension and Education (IPM-PIPE).

DIURNAL VARIATION OF AIRBORNE RAGWEED POLLEN IN KANSAS CITY – A 10 YEAR PERSPECTIVE

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Ragweed pollen in the Midwest United States is a major cause of seasonal allergic rhinitis. Ragweed can be observed to exude pollen from flower heads onto underlying leaf structures after sunrise. As drops of pollen dry and ambient winds increase, pollen becomes airborne and spreads throughout the area. Previous studies describe a diurnal pattern of ragweed exposure with peak airborne pollen levels measures around noon. To corroborate this information, the following studies were conducted.

Volumetric suction collectors (Allergenco Samplaire MK-3 or Burkard) were stationed on the top of a 5 story building in a metropolitan area. The collectors were changed daily except for weekends when the collectors were allowed to operate without attention for 3 days. Slides were stained with Calberlas and pollen grains were counted microscopically at 400 power. During one season individual ragweed pollen counts were generated every 2 hours. Throughout 10 seasons individual ragweed pollen counts were generated every 4 hours.

The 2 hour interval data collected in 1997 indicated that the highest counts occurred at noon (13% of total) and the lowest counts occurred at 6AM (3% of total). The four hour interval data collected from 1997 thru 2006 indicated: midnight 13% of total; 4AM 12% of total (lowest); 8AM 13% of total; noon 21% of total; 4PM 23% of total (highest); and 8PM 18% of total. .

These results indicate a diurnal pattern of ragweed pollen exposure that peaks between the middle of the day and the early afternoon and nadirs during the early hours of the morning. Routine counseling of patients to avoid outdoor activities in the early morning with preference for the afternoon may be incorrect during ragweed season.

EVOLUTION OF RAGWEED AND ALLERGIES PREVALENCE IN QUÉBEC IN THE PAST 20 YEARS

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Climatic change has given a new impetus to aerobiological researches in the past decade, most probably because at the same time significant pollen data base became available. However, we still find in the literature more speculation about airborne pollen and allergies than specific correlations and precise forecasts. The concomitant knowledge of: 1) Ragweed distribution in Southern Québec; 2) annual measurement of Ragweed airborne pollen in Montréal since 1985; and 3) Santé Québec surveys in 1987 and 1998, allowed us to draw a realistic perspective of the evolution of the situation in the past 20 years. Ragweed is accountable for 89% of the rhinitis prevalence in Québec (Christin & Mazur, 1994). Rhinitis prevalence was of 9,4% in Québec in 1998, an increase of 56% since 1987. However, this snapshot mask large regional differences: a 236% increase in Eastern Québec (Québec City), a 12,5% decrease North of Montréal (Laval). There were also significant differences between regions colonized or not by Ragweed; and regions where active Ragweed eradication is taking place, while the overall airborne pollen index was quite stable. Contrary to Grasses pollen (which follow a decreasing trend correlated with rain) and Trees pollen (which follow an increasing trend correlated with temperature), Ragweed seems to be more influenced by land use evolution and human interference than climatic change. Therefore, predictions of increased allergies prevalence due to more abundant pollen loads seem premature.

AMBROSIA POLLEN IN CRACOW, POLAND IN 1995-2006

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Ambrosia is a highly allergenic, anemophilous genus of the Asteraceae family which is composed of about 35-40 species. In Europe five species are recognized including one native species *A. maritima* L. *Ambrosia* occurs on scattered stands in all Polish regions. However, *A. artemisiifolia* occurs more commonly.
The aim of the study was to investigate a twelve year period of *Ambrosia* pollen concentration in Cracow and to analyse season start, duration, peak days and annual totals. *Ambrosia* pollen concentrations show seasonal fluctuation but no clear increasing tendency. Start days appeared in the first half of August (4 years) or in the second half of August (7 years). In 1999 a season started at 3rd September and was very short and intensive. Start days were similar although duration and intensity of seasons were different.
During *Ambrosia* pollen seasons SE and ESE wind directions prevailed, which would suggest a long-distance transport. For peak days synoptic weather situation was analysed. It is likely that high *Ambrosia* pollen concentrations resulted from air masses transport the most often polar continental and tropical masses from easterly and southerly directions when anticyclonic situation occurs over the territory of southern Poland.
Because of low *Ambrosia* pollen concentrations, usually short seasons and many null values, multiple regression analysis showed non significant correlation between concentration and meteorological factors (T_{max}, T_{min}, rainfall, wind direction), or very low percentage of concentration variation.

INFLUENCE OF METEOROLOGICAL PARAMETERS ON RAGWEED POLLEN CONCENTRATION IN BARANJA REGION (CROATIA)

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Short ragweed (*Ambrosia artemisiifolia* L.) is considered to be one of the most competitive plants, capable of causing dramatic yield loss in crop production and dominating disturbed sites by out-competing other weeds and vegetation. In continental part of the Republic of Croatia, short ragweed is most often found in grain fields (particularly sunflower), wheat stubble fields, along the roadsides and railways lines and ruderal areas. Moreover, pollen of this noxious weed is the most important risk factor for allergic disease and the most prevalent pollen in Croatia as well as in many other European countries.
The study was performed using aerobiological and meteorological databases together with field observation during the ragweed flowering season from 2004 to 2006. Data from two Burkard traps (north and south part of investigated territory) were correlated with selected meteorological data. Distribution maps of ragweed were also made.
This invasive plant species spreads extremely aggressively in the Republic of Croatia and occupy a significant part of investigated territory having as a result the large amounts of pollen in the air. The presence of ragweed pollen in the atmosphere of the investigated area occurs between the beginnings of August to the end of September. The maximum pollination is detected from mid-August to mid-September with the peak at the beginning of September in 2004 and 2006 and the end of August in 2005. The results of our investigation show that the contribution of ragweed pollen was quite distinct and changed from year to year. In most of the seasons studied, the ragweed pollen count was statistically significantly correlated with the mean, maximum and minimum air temperature.

PHYTOPHTHORA DATABASE: A CYBERINFRASTRUCTURE SUPPORTING THE IDENTIFICATION, MONITORING, AND MANAGEMENT OF A MAJOR PLANT PATHOGEN GROUP

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Pathogens can rapidly migrate via global trade, human travel and weather-related events. Efforts to map and document the diversity, distribution, and pathology of major pathogens worldwide and share the resulting information are essential to significantly improve our ability to track and manage them. The goal of this project is to enhance our capability of rapid detection, diagnosis, and monitoring of *Phytophthora* species by archiving genotypic and phenotypic diversity of *Phytophthora* in a highly integrative cyberinfrastructure that can easily be searched and updated. Its virulence and ability to spread rapidly establishes *Phytophthora* as one of the most important groups of plant pathogens. The destructive potential of *Phytophthora* diseases is well illustrated by late blight (*P. infestans*), which was responsible for the Irish potato famine. *Phytophthora ramorum*, the cause of sudden oak death in the US and diseases on ornamental plants in the US and Europe, exemplifies a recent threat to both natural ecosystems and the nursery industry. The likelihood that these species will not be the last invasive *Phytophthora* highlights the importance of continuously monitoring the diversity, distribution and dynamics of *Phytophthora*. To support this monitoring, we established a forensic informatics platform, termed the *Phytophthora* Database (PD; www.phytophthoradb.org). In addition to systematically cataloging genotypic and phenotypic data on *Phytophthora* in a web-accessible format, the PD provides a number of data search, analysis and visualization tools to support identification and risk assessment of newly isolated *Phytophthora*. Geographic Information Systems tools will be incorporated to the PD to support the visualization of the distribution and change of *Phytophthora* species and their diseases across environmental, geospatial and temporal contexts. The PD can easily be adopted with minimal modification to create similar cyberinfrastructures for different organisms.

COMPARISON OF FUNGAL SPORE COUNTING TECHNIQUES

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In an effort toward developing a standardized spore counting protocol, the effect of certain parameters on the results was verified.
Optical microscope counting strategies were evaluated for air samples of fungal spores from single stage slit impactors. Grab samples from indoor, outdoor and artificially generated spore sources were analyzed.
Strategies for performing counts using different proportional areas were analyzed to determine which counting technique provided the most representative data set.
The effect of using a reticle was evaluated by comparing counts made on full fields of view with counts using different reticle (graticule) eyepieces.
Counts employing different stopping rules (stopping the count of a spore category at a pre-determined raw count) and inter-transect spacing options were compared to counts that cover the entire trace.
The impact of choice of parameters on results obtained will be weighed against the convenience for the analysts. This approach should contribute toward the goal of developing a mutually agreeable standardized method.

COMPARISON OF POLLEN SAMPLING BY A NEW AND OLD MODEL OF HIRST TYPE OF SAMPLER

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Burkard spore traps are widely used for sampling the bioaerosol composition of the atmosphere. These volumetric samplers are based on the Hirst spore trap (Hirst 1952). Since its introduction for aerobiology sampling, its essential hardware have not changed materially – this is an electro mechanic instrument with air drawn in at 10 litres/min and airborne particles are deposited on a sticky tape mounted on a drum. During the last few years the "Spore Watch" represents another option for scientists offering aerobiology sampling. The new model „Spore Watch“ is an electronic sampler and it provides advanced features such as 16 selectable sampling periods, auto shutdown (avoiding over-impaction) and simple stop/start operation. Moreover, it could be upgraded with data loging equipment.
This next generation of sampler also compares closely to the trap described by Hirst in 1952. The study area corresponds to the North –Eastern Croatia, a province situated at the northeast part of the Republic of Croatia. Both samplers (old and new one) were situated on the roof of a residential building in the centre of the city of Beli Manastir (45º46'N, 18º36'E) at 12 m above ground level. Pollen data of both samplers were collected throughouth the vegetational season (1 March 2004 to 31 October 2004) and analyzed in Palinology Laboratory, Faculty of Agriculture in Osijek.
The both air samplers showed an air flora that reflected local anemophilous vegetation. The dominant taxa registered by both instruments were Ambrosia, Urtica, Poaceae and Quercus without significant differences in pollen count.

Aerobiology 2007

Symposium of the Pan-American Association of Aerobiology
Pennsylvania State University, University Park, Pennsylvania

ABSTRACTS

Poster Presentations

LINKING REAL-TIME ANALYSES WITH REAL-TIME POLICIES: A META-ANALYTIC EXAMINATION OF PUBLISHED LITERATURE INVESTIGATING THE PRESENCE OF FUNGAL AEROSPORES AND THE OCCURENCE OF POOR RESPIRATORY HEALTH IN OCCUPANTS OF DAMP BUILDINGS. *PROSPECTUS*

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In recent years, scientists and policy-makers have suspected that the presence of fungal colonization, commonly identified by aerospores, in damp indoor environments had a detrimental influence on occupant respiratory health, specifically allergies and asthma. A meta-analytic quantitative review of current published literature may better describe the relationship between fungal-producing agents in indoor environments and adverse health effects of human occupants. In 2004, The Institute of Medicine (IOM), whose mission it is to examine federal policy matters pertaining to public health in the United States, published Damp Indoor Spaces and Health, an evidence-based investigation attempting to understand the connection between fungal-producing agents in indoor environments and adverse health effects. The committee of experts representing the IOM stated therein that they found "sufficient evidence of an association" between health outcomes and the presence of mold or other agents in damp indoor environments for upper respiratory tract (nasal and throat) symptoms, cough, wheeze, and asthma symptoms in sensitized asthmatic persons. The committee clearly defined the parameters of each category and at the time of publication could not conclude that a causal relationship existed between the presence of fungal agents in damp, indoor spaces and poor respiratory health.
Another evidence-based evaluation of the literature noted in the IOM report, as well as literature cited from an independent research review identifying additional citations from 1980 to the present, may provide a heterogeneous collection of studies suitable for a meta-analytic examination. Selecting statistical models, specifying study variables, quantifying effect modifiers, adjusting for bias, utilizing confounders, and performing relative risk analysis are all important tasks of a meta-analysis attempting to further describe the relationship between the presence of fungal colonization in damp buildings and poor occupant respiratory health.

MONALISA: MONITORING NETWORK OF ALLERGENS BY IMMUNO-SAMPLING

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After demonstration of the interest of allergens measurement in the air with ELISA or immunofluorescence techniques presented in the 7th and 8th ICA, and the development of a new cyclonic air sampler giving liquid samples, authors decided to propose an European Project. The project was accepted in July 2005 within the program LIFE ENVIRONMENT demonstration project with the name of MONALISA "Monitoring Network Of Allergens by Immuno-Sampling". The main objective is to demonstrate the use of an innovative cyclonic air sampler in association with immunological analysis methods to validate a new approach of pollen monitoring. This new method is one line measurement of antigenicity/allergenicity.
The different steps over 2005-2008 are:
-Consolidation of a specification list for the air sampler in accordance with analysed sites requirements, adaptation, manufacturing and optimisation of the air sampler.
-Preparation of standard analysis ELISA protocols associated to the air sampler measurements. Six taxa were chosen: *Betula*, Poaceae, *Parietaria*, *Olea*, *Cupressus* and *Alternaria*.
-Demonstration of the robustness and efficency of the air sampler in 7 different bio-geographic areas.
We hope, at the end of the project, to be able to measure the antigenicity/allergenicity of the main allergenic taxa and to separate some stenopalynos grains as *Parietaria* pollens from *Urtica* pollens, with different allergenic risks.

POLLEN FLORA OF EXHIBITION GROUNDS WITH SPECIAL REFERENCE TO THEIR ALLERGIC SIGNIFICANCE

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Aeropalynological studies are important because airborne pollen are the chief causative agents of the respiratory disorders, hay fever and allergic diseases such as conjunctivitis, atopic dermatitis, bronchial asthma, hay fever are most prevalent . In India, allergy and asthma have recorded three-fold increase from 10% to 30% during the last three decades. Hyderabad is actively growing city both in industrialization and urbanization. As dust harbours pollutants, there is need for monitoring biological pollutants, which are directly related to allergenicity. Aeropalynological studies are conducted at Exhibition Grounds, an active site of Hyderabad - capital of Andhra Pradesh. Survey was carried out using gravity slide technique from 2004-2006 to assess the frequency of airborne pollen. Lung efficiency of local residents was done using W.H.O. questionnaire and a peak flow meter. Peak flow meter is a handle held device used to measure any airway obstruction for different age groups. Skin prick test was performed under the guidance of Medical doctors. In the present study, the total number of pollen grains identified was 7,028 belonging to 53 pollen types. Pollen counts were expressed as pollen catch/cm. Among them some of the outnumbered pollen types are Grass*, Ricinus communis, croton bonplandianum, Parthenium hysterophorus*, *Prosopis juliflora, Cocos nucifera, Amaranthus* sp, etc. Common aeroallergic pollen is represented by the members of Grass, *Amaranthus* sp, *Parthenium hysterophorus, Cocos nucifera*, *Azadirachta indica*, *Cassia* sp. The results of the questionnaire show normal green zone (21%), yellow, cautious zone (56%) and red, danger zone (23%). The skin prick tests were performed and found to be positive with the pollen of grass pollen (28%) *Amaranthus* sp. (23%), *Parthenium hysterophorus* (20%), *Cocos nucifera (16%), Azadirachta indica (15%), Cassia* (8%). Skin prick test and medical diagnosis confirms the availability of pollen in the environment and its allergenicity in the susceptible individuals causing allergy. This work got good support from the public and also benefited the individuals in medical diagnosis and treatment for their ailments.

PREVALENCE OF MYCOFLORA IN HYDERABAD – A METRO CITY

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Today India is emerging as a developed country. The change is the result of the improvement and breakthrough in the fields of Biotechnology, Information Technology, Medicare, Industrial development and Tourism. As we have two sides of a coin the advancement has advantages on one side and disadvantages on the other side. It is estimated that at least one lakh people (100,000) die each year from urban air pollution. Hence there is an urgent need to monitor and analyse the population load. Continuous monitoring of air can help us to assess the pollution load and to study its impact on the public health. Thus with this aim, Tilak's air sampler was set at 15 ft height at Exhibition grounds in Hyderabad. The study was done for one year from 2003 - 2004. Over 110 spore types were identified during the period and these spores were segregated into five groups – Mastigomycotina, Ascomycotina, Zygomycotina Basidiomycotina and Deuteromycotina. Total number of spores found were 8, 48, 764. Among these spores, Deuteromycotina contributed the highest % by giving 90.08% followed by Ascomycotina 4.48%, then by Basidiomycotina 2.32% and Zygomycotina 0.02%. Miscellaneous spores contributed 2.69%. Among all these spores *Alternaria, Aspergilli, Cladosporium, Curvularia, Deightonella, Dreschlera, Lacellinopsis, Helminthosporium, Nigrospora, Periconia, Pithomyces and Torula* were found to be common throughout the year. These are allergenic spores and are found with higher counts than the other spores. *Aspergilli* dominated the other allergens followed by *Periconia* and *Nigrospora*. More spores were found in rainy season followed by winter and then by summer thus showing seasonal variation. Spirometry, the lung efficiency test was done to know the pollution impact on public health. It was observed that both FEV1/FVC are reduced proportionately in respiratory disorders.

PATTERNS OF AIRBORNE *ALTERNARIA* SPORES IN BUDAPEST, HUNGARY

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Alternaria spores trigger respiratory allergy symptoms in sensitive individuals. To reduce the risk for allergic patients, we constructed predictive models for the spore levels in Budapest, Hungary. Air sampling was conducted over 2003-2006 using a Hirst-type (Burkard) trap at 23 metres height. The monthly means of diurnal periodicity curves were calculated, and the patterns of the curves were expressed with binary variables [0 or 1 according to the absence or presence of the following criteria: peak(p)1=04-06h, p2=12-14h, p3=17-20h, p4=22-02h, p1<p avg., p2-p3<3h, p4>p avg., |p2-p3|<(p2+p3)/20, gap(g)1=06-08 h, g1>g avg.] The curves were compared using complete linkage method (cluster analysis). Months with regular and irregular diurnal pattern were separated. In the former group diurnal curves showed one peak between 04-06h and two peaks in the afternoon (12-14h; 17-20h). Within the regular group two sub-groups were clustered: the first regular group (G1) had major differences between the concentrations and the timings of the two peaks in the afternoon. This pattern was frequent between June and July. The second regular group (G2) occurred mostly between July and October and showed two similar peaks close to each other in the afternoon. Multiple regression analysis was performed using a forward stepwise method (MR) to reveal the relationship between monthly means of diurnal patterns (1=regular, 0=irregular) and meteorological factors. Regular diurnal patterns disrupted by the fluctuation of the temperature ($p<0.01$) and atmospheric pressure ($p<0.04$, $r^2=0.67$). To predict *Alternaria* concentration MR was applied for different periods: „90% spore season" was compared to the regular pattern period (G1+G2). Regression model indicate that up to 59% of the variation of the *Alternaria* spore concentration can be explained by the variables in the G1+G2 period, and 42% when the „90% spore season" method was used. The 1-day lag of *Alternaria* concentration and 1-day lag of atmospheric pressure seemed to be the most important factors to determine *Alternaria* concentration in the G1+G2 period.

IMPACT OF APHID FEEDING ON THE AIRBORNE CONCENTRATION, VIABILITY AND GERMINATION OF RAGWEED POLLEN

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Common ragweed (*Ambrosia artemisiifolia*) is the most important invasive weed species in Hungary, where the concentration of its allergenic pollen may reach 1000 pollen/m^3. The aim of this study was to test the effect(s) of aphids on pollen production. Ragweed seedlings were grown in individual pots in greenhouse. At 4-leaves stage each seedlings were artificially infested by five apterous aphid individuals of *Aphis fabae*, *Brachycaudus helichrysi* or *Myzus persicae.* The air borne pollen production of the infected plants were measured 4 weeks later, in flowering stage. The plants were individually placed into a 45×50×45 cm chamber connected to a Hirst-type trap. Air sampling was conducted for 5 minutes then samples were prepared with the pyrogallol-red containing stain 'aroprot', and scanned with microscope to count pollen and categorize them as totally, semi-and non-coloured. In a second experiment, polyethylene bags were placed onto male floral spikes to collect deposited pollen during the vegetation period. To count pollen grains pollen was recovered by wortexing in 250 mL 0.02 % Tween 20. To measure pollen viability and germination, 1-1 anthers were collected from 3-3 male flowers from the main flower spikes of each plant. Fluorescein diacetate solution was used to stain the plasmalemma of the pollen grains as an indicator of viability visualized under fluorescence microscope (350-400 nm). Pollen grains were germinated in 1.2 M sucrose solution containing mineral salts. After incubation (4 hrs 25 ^{o}C, 100% R.H.) the ratio of germinated and non-germinated pollen was assessed. Plants were harvested after 36 days, following aphid infestation and were placed into Berlese-funnels for assessing the number of aphids by plants.. Dry weight of plants was also measured. The experiments were repeated twice. The presence of the aphid colonies over a five week period has significantly reduced plant height, length of flower spikes, dry weight of plants, and number of male inflorescences in case of all the three aphid species. Airborne and total deposited pollen counts, as well as the viability and germination of pollen grains were reduced significantly by *A. fabae* and *B. helichrysi*. The latter species produced the largest colonies, and showed significant preference for ragweed over sunflower in a host plant choice test. Future field experiments should study the impacts of longer feeding periods by *B. helichrysi* on common ragweed. The project was supported by GVOP-3.1.1.-2004-05-0111/3.0.

CHARACTERIZATION OF VOLATILE ORGANIC COMPOUNDS OF INDOOR FUNGAL ISOLATES UNDER DIFFERENT ENVIRONMENTAL CONDITIONS

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Several fungi produce microbial volatile organic compounds or MVOC's. It is thought that these MVOC's are responsible for moldy odors in mold infested buildings and may also contribute to the deleterious health effects experienced by some individuals when they are exposed to moldy environments. Microbial volatile organic compounds are increasingly being used as investigative tool in indoor air quality (IAQ) evaluations. MVOCs are usually detectable before any visible signs of microbial growth appear. MVOCs can therefore serve as early indicators of potential biocontamination problems. The main objective of this study was to determine if the usual indoor fungi produce species-specific MVOC's that may be used in rapid identification and characterization of these fungi.
Ten fungal species previously isolated from indoor environment were screened for microbial volatile organic compounds. The species include *Aspergillus niger, A. versicolor, Alternaria, Trichoderma, Cladosporium herbarum, Penicillium species, Bipolaris spicifera, Fusarium solani, Fusarium oxysporium and Mucor sp.* Air samples from pure cultures were adsorbed onto Tenax GR and analyzed by thermal desorption in combination with GC/MS and HPLC. A large number of terpenes were identified and some compounds such as 3-methyl-1-butanol, 1-octen-3-ol, acrolein and few ketones were produced by a number of species. The MVOCs were not particularly species-specific volatiles. Each species had a MVOC profile, which varied in response to external factors such as cultivation media, temperature, pH and water activity level. The cultivation on different substrata also changed the number and concentration of MVOCs. These volatiles may serve as markers for the early detection of fungal species and their intensity in indoor environments.

CORRELATION OF METEOROLOGICAL FACTORS, AEROALLERGEN AND ASTHMA LEVELS IN KUWAIT: A 12 MONTH RETROSPECTIVE STUDY.

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The aim was to investigate retrospectively the joint effect of aeroallergen, environment temperature change, humidity levels, wind speed and precipitation on daily asthma admissions. The daily vist to Al-Rashid allergy center for up to one year was taken. Spore and pollen counts were measured hourly. Airborne fungi was monitored using the Burkard spore trap. Functional relationships between aeromycota (air molds), pollen count and meteorological factors were analyzed. The meteorological factors were: mean temperature, minm temperature, and max. temperature, mean wind speed, relative humidity, rain and max. wind speed. For the relation between allergic symptomology and environmental conditions, a time series analysis, utilizing a STATA package was used.
From January 2003, total count of the files for the people who received asthma treatment from Al-Rashid Allergy Center was 4353 for the 12 month period. The data collected shows that the number of patients were high in the month of the December about 760 (asthma -540, rhinitis -195, asthma and rhinitis -25) the patients effected by asthma is high when compared with rhinitis and asthma and rhinitis. High number of emergency patients also admitted. The important factors for the rapid increase in the patient number observed were Max. average temperature is about 19.70c and Min average temperature is about 11.00c. Max relative humidity 66 -100%. High precipitation was ppt - 66.30mm. The average fungal spore -1960.25 /m3. The highest number of patients in the month of September and October due to the highest number of average pollen grain count compared with other months.
Analysis using alpha values of 10% for level of significance, found that wind speed do not influence asthma, but temperature and humidity do have a significant influence, with p-value of 0.050 and 0.097 respectively. The confounding effects of pollution and allergen were not studied.

POLLEN AND FUNGAL SPORES IN THE ATMOSPHERE OF SAN JUAN, PUERTO RICO: A RETROSPECTIVE STUDY FROM MAY 2005 UNTIL MAY 2006

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The atmosphere contains bacteria, viruses, fungi, and volatile substances that in sufficient amounts are harmful for the health of each person exposed. The affections results from the inhalation of these particles that are dispersed by the air currents. In Puerto Rico, the respiratory diseases affect 33% of the population and, although the causes are discussed from the perspective of genetic origin, it seems to indicate that there are environmental factors that transform a high percentage of the population into susceptible ones. The Allergenco ® Air Sampler (MK3) was used to monitor the concentrations through a twelve month span. Microscope slides capture several impacts, which it is then stained with calcofluor and observed under the microscope under white and ultraviolet light. Atmospheric conditions were recorded daily through a Weather station®. The results indicate that the fungal spores are present in San Juan throughout the year. The most frequent spores were basidiospores, while the biological particulate presented a circadian rhythm where the concentration is higher during the early morning. Rain and wind were dispersal factors, and the percent of humidity and the dew point favored the increase of spores in the atmosphere. Contrary to spores, pollen is least frequent although its allergenic potential cannot be excluded. Quantification of spores and pollen serves to establish dynamism of the particular in the atmosphere, and the data obtained could be used to elaborate calendars of spores that could help the sensitized population to design preventive measures according to the atmospheric circumstances in the tropic.

AEROMYCOLOGICAL STUDIES IN THE LIBRARY OF JALGAON, INDIA

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Libraries are the knowledge banks having tremendous collection of books. Books are made up of paper i.e. cellulose and hence can be easily degraded by microorganisms including fungi. Fungi play important role in staining and deterioration of books. Air and dust mycoflora of working library of Moolji Jaitha College, Jalgaon was studied to investigate different fungal species responsible for deterioration of books in the library. Total 15 genera and 35 species were isolated using Exposure Plate Method and Direct Inoculation Method. Sampling was done in the morning and evening. Among the different isolated genera *Aspergillus* was the dominant genus with 13 species. The Deuteromycotina members were very common and showed luxuriant growth in the dust on books. The frequency of occurrence of cellulose degrading fungi was remarkably more in the morning than in the evening.

AIRBORNE POLLEN & MOLD DURING THE WINTER MONTHS IN CENTRAL MINNESOTA

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The purpose of this study was to monitor the concentration of pollen and mold spores that occur in the air during the winter months in central Minnesota (U.S.A.). Although pollen and mold levels during the growing season (May – Sept) have been previously reported for our area (Zenzen *et al*, PAAA meeting 2006), this is the first systematic study of the winter flora. A Rotorod sampler on the roof of a three-story building on the campus of St. John's University collected samples approximately every other day between mid-September 2006 and April 2007.

Low levels of pollen were observed throughout the sample period (average: 0.87 grains m^{-3}). On 79.9% of the winter sampling days, at least one grain was observed. Pollen levels decreased throughout the winter reaching a low point in November and didn't rise significantly until mid-March when the spring species (*e.g*., elm, poplar) appeared. Fifteen different species were identified during the sampling period. Ragweed, chenopod, sage, and juniper were the most abundant pollens comprising 34.4%, 19.4%, 12.9%, and 11.8%, respectively, of the identified species. Ragweed was found throughout the sampling period. Chenopod and sage pollen primarily occurred in samples during early winter while juniper pollen predominated during the late winter.

Similarly, mold spores, rusts, and algae could be observed throughout the winter sampling period, even during the coldest periods. Levels of these particulates were relatively low (mold winter average = 1351 spores m^{-3}; algae = 0.54 m^{-3}, rusts = 1.85 spores m^{-3}). Mold spores were observed on every sample day while rust spores and algae were observed on 76.1% and 89.5% of the sampling days, respectively. In general, the levels of these airborne particles declined markedly in November and remained low until mid-March.

These results are similar to those reported for Minneapolis/St. Paul (Frenz & Murray, 1997) and indicate that our air is rarely free from potential allergens.

PHAKOPSORA PACHYRHIZI UREDINIOSPORE ESCAPE FROM A SOYBEAN CANOPY

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Predicting the potential arrival of soybean rust (*P. pachyrhizi*) through the use of aerobiological modeling may help growers decide if a fungicide application is needed. Many of the variables that govern the aerobiological transport of *P. pachyrhizi* from one location to another are well understood. However, *P. pachyrhizi* spore escape from a soybean canopy is a poorly understood aspect of the modeling process. The objectives of this research were to estimate the proportion of released *P. pachyrhizi* spores that escape a soybean canopy and relate this value to atmospheric turbulence and canopy structure. Spores were collected for 15-minute intervals near the center of a severely diseased field of soybeans at the University of Florida, North Florida Research and Education Center in Quincy, FL. Spores and paint chip particles were also sifted onto healthy canopies and were collected in the same manner. An experiment was also conducted at the Russel E. Larson Agricultural Research Farm at Rock Springs, PA using only particles. Rotorod samplers were placed on four vertical towers at heights relative to canopy height, H, at the following levels: 0.5 H, 1.0 H, 1.5 H, and 2.5 H. The towers were situated in a 3.0 x 3.0 m square. Atmospheric turbulence was measured using a 3-dimensional sonic anemometer (CSAT3). A total of 3 experiments and 37 trials were conducted during the summer of 2006. The measurements indicated that atmospheric turbulence, canopy structure, and atmospheric stability were important predictor variables for the proportion of released spores that escape a soybean canopy.